

## **NFRC Verification Program for Optical Data**

### **Appendix D to PCP**

#### **1. Purpose**

The NFRC rating systems for center-of-glazing U-factor and SHGC (NFRC 100, NFRC 200) rely on spectral optical properties for input to the Window 4.1 computer program. These optical properties are measured and calculated in accordance with NFRC 300-94 "Procedures for Determining Solar Optical Properties of Simple Fenestration Products" and ASTM E 1585 (NFRC 301-93) "Standard Test Method for Emittance of Specular Surfaces Using Spectrometric Measurements." In order to ensure that the glazing manufacturers apply these procedures properly to provide uniform and credible spectral data, a verification program is outlined in this appendix.

#### **2. Qualifications for Submitting Data**

All submitters of optical data shall have successfully participated in a round robin test. NFRC shall sponsor future round robins at least every 5 years or more frequently as needed. For new data submitters, this requirement can be fulfilled temporarily by submitting at least one sample with measured data to the Optical Properties Subcommittee for experimental comparison. This temporary certification shall be valid until the next general round robin. Manufacturers are allowed to submit their own data subject to the requirements of this verification procedure.

#### **3. Determining Representative Data**

A critical element of the data validation process concerns the determination of data that properly represents a given product. Optical properties may vary depending on many factors such as manufacturing site and batch or nonuniformity of the product itself. The most rigorous solution would be a thorough statistical analysis of production data. This type of analysis may not always be practical. Some manufacturers perform extensive on-line and off-line diagnostics and maintain detailed records. Others rely more on inspection, experience and less frequent sampling.

It is considered to be outside the scope of NFRC to attempt to constrain all manufacturers large and small to the same type of instrumentation and level of quality control. Therefore, the specific methods of data determination will be left to the individual manufacturer under general guidelines given in this section. Safeguards against manipulation of the data or biased choice of sample are built into the Preliminary Screening, Peer Review, and Challenge Procedures described below.

Data should represent average solar and thermal properties for the product as sold by the submitter (prior to any fabrication processes). This may be the result of measurements on many samples or a single measurement on a sample believed to be typical. Representative data is submitted for a nominal glass thickness, but actual samples will vary in thickness. In the event of

a question or challenge, reviewers might retest a set of randomly chosen samples of the same product and compare the average to the submitted data.

**The submitter shall store and retain at least one sample that best fits the average properties of the submitted representative data. Coatings that are known to be unstable outside of a sealed insulating glass unit shall be stored in a dry atmosphere. Possible degradation of unstable samples shall be considered in a challenge review.**

Expected instrument measurement tolerances for spectral measurements are currently considered in the standards to be  $\pm 0.01$  for transmittance data and  $\pm 0.02$  for reflectance and emittance data. This is based on results of the first round robin. These values may be used for guidance in a challenge. For example a published transmittance value of 0.50 would be expected to result in a value of 0.49 and 0.51 in subsequent tests.

#### **4. Submitting Data**

All spectral data files submitted for use in the NFRC database shall be submitted with an approved form (appended) providing some basic information about the tests that were performed. A representative of the submitter shall sign this submission form verifying that measurements were made in accordance with standard procedures.

#### **5. Preliminary Screening**

Initial screening of format and content will be performed for each new file by a group of technical experts chosen by NFRC not to include manufacturer's experts. Data will be checked for conspicuous errors such as discontinuity, excessive noise, nonphysical values, correct intervals and completeness of the file in accordance with appended checklist. This review shall normally occur within 2 weeks of submission at which time the completed checklist shall be sent to the submitter. If the data passes, then the submitter signs and returns the checklist indicating willingness to release the data for peer review. If problems are discovered, this stage will be extended indefinitely until the problems are resolved.

#### **6. Peer Review**

Upon completion of the preliminary screening, data will be distributed for peer review. Participants in the peer review shall include all parties who have ever submitted spectral data. This phase shall last for 3 weeks. If no questions are raised during this time, then the data automatically passes. If a question is raised, the following procedures shall be followed:

1. The questioner must provide the following information in writing:
  - a) The name of the product and data file in question.
  - b) A clear statement of the suspected problem.

- c) Any supporting evidence for the question. This evidence might include purely technical data such as a measurement on a similar sample or it might be nontechnical such as a reference to contradictory product literature.
- 2. NFRC will then investigate the information submitted by the peer reviewer. The data submitter will be given the opportunity to resolve a misunderstanding or otherwise demonstrate that the question is not valid. If the questioner is not convinced then one or more samples will be requested and measured by the independent experts chosen by the Subcommittee. If the results agree with the originally submitted data then the question will be overturned.
- 3. If the measurements do not agree with the originally submitted data then the submitter may choose to:
  - a) Withdraw that product from consideration for use in the NFRC database.
  - b) Resubmit another set of representative data of the product.
  - c) Ask for reconsideration of the representative data in accordance with the Appeals section.

## **7. Acceptance Process**

**Upon completion of Peer Review, the Subcommittee representatives shall mark the data files with the # sign indicating that they have met the technical requirements of NFRC and forward the marked files to NFRC staff. NFRC staff shall formally notify the Submitter, Peer Reviewers and Certified Simulators that data for each product has been accepted for use in determining NFRC ratings on fenestration products. Ordinarily the process of notification and posting by NFRC should take no more than 1 week.**

## **8. General Challenge Procedure**

The spectral data published by NFRC is open for challenge by any interested party. General Challenges shall be filed through NFRC and shall follow the procedures outlined in Section 5.0 of the NFRC Product Certification Program (PCP) 1-92 with the following exceptions:

- a. References to products identified in the Certified Product Directory shall now apply to products identified in the NFRC spectral data files.
- b. Notice of Challenges shall be submitted directly to NFRC rather than an accredited Independent Certification and Inspection Agency (IA).
- c. Escrow deposits charged to the challenger shall be held by NFRC.
- d. The validity of the challenge shall be determined by the NFRC Challenge Board and in accordance with the guidelines and tolerances outlined under Section E Data Review.

## **9. Appeals Procedure**

A submitter of optical data may disagree with the measurements determined by NFRC (or its designated representative) as part of a review question or formal challenge. In such case, the submitter may choose to provide a second set of samples for a more extensive analysis. This second set must consist of a minimum of 10 samples chosen at random from two or more production runs. The NFRC shall distribute the samples to two other facilities (not involved in the question or challenge) that have successfully submitted spectral data to the NFRC database. These facilities have a maximum of 14 days to review the samples and return results to NFRC. NFRC will review the results of the spectrometric measurements from these sources to make the final determination regarding validity of the representative data of a product.

## **10. Withdrawal Of Acceptance**

Any questioned or challenged product that is determined to have properties that are not in agreement with the original data shall be removed from the list of products approved for rating and labeling purposes by the NFRC. NFRC shall send a formal letter to the submitter notifying them of the results of the appeal/challenge. Subsequent updates of the NFRC database will exclude the product unless new data is submitted and accepted in accordance with the timelines and procedures outlined in this program.